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Re: Comments on Notice of Proposed Rulemaking, Commercial Space Transportation Reusable launch Vehicle and Reentry Licensing Regulations, Docket No. FAA-1999-5535 - I 6

Enclosed please find two copies of the comments of Kistler Aerospace Corporation on the above-captioned matter.

Very truly yours,

Robert L. Meuser
Senior Vice President and General Counsel for Regulatory Affairs

COMMENTS TO

REUSABLE LAUNCH VEHICLE AND REENTRY LICENSING REGULATIONS; PROPOSED RULE

DOCKET NO. FAA-1999-5535; NOTICE NO. 99-04

COMMENTS PROVIDED BY

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JULY 20, 1999

Kistler Aerospace Corporation
Comments To

Commercial Space Transportation
Reusable Launch Vehicle and Reentry Licensing Regulations; Proposed Rule
Docket No. FAA-1999-5535; Notice No. 99-04

Table of Contents

Introduction *1*

1.0 Proposed Regulatory Framework for the Licensing of Reusable Launch Vehicles. *2*

1.1 Introduction and Approach 2

1.2 Description of Regulatory Framework *3*

2.0 Comments on NPRM *7*

2.1 Definition of Reentry 7

2.2 Casualty Expectation Analysis for Licensing 8

2.3 Separating Ascent and Reentry Risk Assessments 9

2.4 Use of a Failure Probability of 1.0 for New Systems 11

2.5 Overflight of Populated Areas 11

2.6 Determination of a "Proven" System 12

2.7 Telemetry and Autonomous Operations 13

2.8 Assessing Continued Flightworthiness (Reflight) 14

2.9 Reentry Site Definition 15

2.10 Test Program 15

2.11 Licensing of Re-entry Sites 16

Introduction

The Kistler Aerospace Corporation welcomes the opportunity to comment on the Notice of Proposed Rule Making for the Licensing of Reusable Launch Vehicles and Reentry Vehicles issued by the Federal Aviation Administration (FAA). The development of such rules marks a milestone in the evolution of the launch industry.

Kistler believes that at this critical juncture, we must all take a forward-looking stance to ensure a healthy RLV industry in the future. As technology and the industry advance, so must the regulatory regime that governs them. It is most important that we all understand that we are currently witnessing the birth of an industry, not its maturation.

> *While none of us can clearly see the future shape of the industry or the systems that will populate it, we must endeavor to formulate a licensing regime that is flexible enough to evolve without compromising safety.*

Kistler believes that such a forward-looking stance is best taken by outlining a licensing regime that is adaptable to industry developments. More importantly, it must consist of performance driven standards and avoid design mandates such as the need for man-in-the-loop systems. Such design mandates serve only to stifle innovation or to send the industry overseas.

To provide such a flexible regime capable of adapting to and evolving with the RLV industry, Kistler proposes a new Regulatory Framework for the Licensing of Reusable Launch Vehicles. This Regulatory Framework utilizes the requirements presented in the FAA's NPRM as voluntary guidelines for license applicants, but allows each applicant to propose a set of submittals and assessment criteria that it considers most appropriate for the system being licensed. The proposed set of submittals and assessment criteria would be negotiated and agreed to in advance by both the FAA and the applicant.

Kistler recognizes the tremendous effort put forward by the FAA to not only create this NPRM, but to do so in such a short time frame. Kistler would like to encourage the FAA, and offers Kistler's assistance, in fashioning the regulations outlined in this NPRM into the broader, more flexible licensing regime necessary to foster the growth and maturation of the RLV industry in the United States.

1.0 Proposed Regulatory Framework for the Licensing of Reusable Launch Vehicles

1.1 Introduction and Approach

The following, industry-endorsed recommendation for a new regulatory framework for the licensing of Reusable Launch Vehicles (RLV's) evolved as the result of industry deliberations on the matter. The Commercial Space Transportation Advisory Committee (COMSTAC) RLV Working Group undertook in October 1998 to develop recommendations to the FAA regarding the form and substance of RLV licensing regulations.

This Regulatory Framework is reprinted from the RLV Working Group report titled Final Report on RLV Licensing Approaches dated April 29, 1999. This report received the endorsement of 7 of the 8 RLV developers who were members of the Working Group, and has already been submitted to the FAA for consideration.

Kistler wishes to incorporate this recommendation into its comments in the belief that the published NPRM will stifle innovation in the RLV industry, and make the industry's maturation a long and difficult process.

Kistler encourages the FAA to consider the adoption of a Regulatory Framework such as the one presented below and to use the existing NPRM as voluntary guidelines within that Framework.

COMSTAC RLV Working Group

Framework for Regulation of Reusable Launch Vehicles

1.1.1 <u>Justification for a New Regulatory Framework for Reusable Launch Vehicles Allowing Individualized Approaches to RLV Licensing</u>

1.1.1.1 The Commercial Space Transportation Advisory Committee (COMSTAC) Reusable Launch Vehicle (RLV) Working Group has been attempting to define a regulatory regime for RLVs. This effort is made challenging by the diversity of vehicle configurations, flight scenarios, and capabilities. The Working Group believes that this diversity reflects a healthy, creative industry and should not be discouraged.

1.1.1.2 In attempting to develop a licensing regime to recommend to the FAA, the members of the RLV Working Group recognized that each proposed approach assumed, either implicitly or explicitly, a system concept, or at best a small range of concepts. In attempting to combine these various approaches, the Working Group realized it would be difficult for a single licensing regime to fairly address all of the concepts under development for the following reasons:

a. Firstly, the Working Group realized that imposing a single licensing regime upon all RLV systems could inhibit innovation, technical advancement and competition in the emerging RLV industry.

b. Secondly, the Working Group concluded that a single licensing regime might not be required to assure public safety. Indeed, a single regulatory regime could dispose prematurely of innovative approaches to safety and risk mitigation that might advance public safety and ultimately benefit the entire industry.

1.1.1.3 *The RL V Working Group concluded, therefore, that a single licensing regime to serve all concepts is not only improbable, but also undesirable. Rather, RLV regulations should provide a legal framework within which a clear path to licensing can be determined for each system configuration.*

1.2 Description of Regulatory Framework

1.2.1 <u>Summary</u>

Under the proposed Regulatory Framework, each developer will submit a Licensing Plan for negotiation and agreement with FAA/AST (AST). Once agreed, the Licensing Plan will be binding upon both the applicant and the AST. Any changes or waiver requests to an applicant's Licensing Plan will be submitted to AST with detailed rationale/documentation and approved by AST as an amendment to the applicant's Licensing Plan. Satisfactory completion of the tasks agreed to in the Licensing Plan would be sufficient for the FAA to issue a Launch License.

In recognition of the FAA's primary mission in regard to the safety of the public, this Licensing Plan will identify, in advance, the threshold(s) against which an applicant's safety assessment will be measured. It will explain the chosen methodology, and present the tools to be used in the analysis. This methodology may be a maximum expected casualty (E,) calculation, or some other methodology proposed by the developer and agreed to by the FAA.

> If the applicant proposes to conduct an E_c computation, the Licensing Plan will detail the method in which it is to be calculated and the analyses, tests and other documents that must be performed to substantiate the numbers used in the calculation. If some other methodology is used, the analyses, tests and documentation that must be performed to show an acceptable level of safety will be specified. In either case, the completion of credible analysis resulting in attainment of the agreed upon assessment criteria shall be grounds for licensing.

1.2.2 Licensing Guidelines for RLV Applicants

To aid applicants, the AST will develop and issue Licensing Guidelines for RLV Applicants. The Guidelines will set forth the submissions, methodologies and criteria that, when followed by the applicant, will lead to the issuance of a license. The RLV Working Group expects that the FAA initially will draw from licensing criteria used in licensing Expendable Launch Vehicles (ELVs), until it develops independent experience in licensing RLVs.

These Guidelines would be instructive, but not mandatory, to encourage innovation and to avoid rigid regulatory requirements. The Guidelines would evolve over time as the industry matures and the FAA gains experience in licensing various RLV systems. The topics addressed by the FAA Safety Guidance for RLVs (issued January 1999) might be incorporated in these Guidelines. (The RLV Working Group's comments on the FAA Safety Guidance are set forth in Part 1.)

If the applicant believes that the applicant's system configuration, operations, or vehicle design warrants a variation from these guidelines, the applicant will explain and justify the variation in the negotiation of the Licensing Plan. In assessing variations, the FAA will take into consideration the vehicle configuration, whether the vehicle is manned or unmanned, the proposed site of operations, and other factors related to public safety.

1.2.3 Licensing Plan

(a) Procedures for Negotiation of Licensing Plan; Legal Effect

Early in the licensing process, an applicant would propose to the AST a Licensing Plan defining licensing requirements for the applicant's proposed launch operations. The Licensing Plan would define required documentation, analyses, methodologies and tests, and a schedule for these submissions. The proposed plan would clearly identify any variations from the AST Guidelines.

Upon formal submission of a complete Licensing Plan, the AST will have 90 days in which to respond formally. It is anticipated that the applicant would consult with the AST on the Licensing Plan both before formal submission and during the 90-day review period.

> The AST may accept or reject the Licensing Plan. The AST will state the reasons for rejection of the proposed Licensing Plan. Once agreed, however, the licensing plan will be binding upon both the applicant and the AST.

The Licensing Plan, at all times, is the possession of the developer. It is the developer's prerogative to formally submit it at any time to the AST for acceptance or rejection.

(b) General Content of Licensing Plan

The Licensing Plan does not comprise the documents, analyses, and test reports themselves. Rather, the Licensing Plan is an outline in which the developer is proposing a set of documents, tests, and analyses, and a description of their contents adequate to enable the FAA/AST to reach a determination on the sufficiency of information that subsequently *will* be presented in the licensing process.

The Licensing Plan proposal accordingly will include a reasonable description of the documents and their contents. It is the responsibility of each developer to present clear descriptions of his proposed submittals to AST for discussion along with justification for any variation from the Guidelines. AST will strive to identify acceptable methodologies and techniques for producing the required documentation.

Documents to be submitted by the developer may include:

- Substantive System Definition
- System engineering and integration plans
- Verification and validation plans and results
- FMECA and critical components list
- System safety and health plans
- Contingency and emergency management
- Maintenance and refurbishment plans
- Flight test program
- Probabilistic risk assessment

Each developer is responsible for proposing an assessment methodology and criterion (a). Examples of assessments requiring specific methodologies include casualty expectation analysis and FAR compliance, or any other methodology and criteria proposed by the applicant. The methodology and criteria may be qualitative or quantitative as the developer sees most appropriate for his system.

(c) Schedule of Submissions

Each proposed Licensing Plan will include a schedule culminating in a date for issuing the license. The schedule should include submittal dates, AST response dates, meeting dates to resolve disagreements, and, finally, a license issuance date.

2.0 Comments on NPRM

2.1 *Definition of Reentry*

Synopsis

The FAA defined reentry to begin when the vehicle's attitude is oriented for propulsion firing to place the vehicle on its reentry trajectory. The FAA considers everything after that re-orientation, as well as any activity prior to re-orientation undertaken to prepare for reentry, as licensable. The FAA is soliciting comments on how such a threshold should be defined.

Kistler's Comments

Kistler believes that the FAA's definition of reentry is unnecessarily broad and could lead to FAA licensing of all on-orbit activities. Consequently, Kistler would like to offer an alternative definition.

As part of its nominal mission profile, the Kistler K-l vehicle undertakes a phasing maneuver shortly after payload deployment. The maneuver is necessary to place the vehicle's ground track over the landing site at the proper time for reentry 22 hours later.

By the FAA's definition, this phasing maneuver could be considered "preparation for reentry" since it sets the vehicle up for reentry at the proper location.

In addition, such activities as the implementation of a thermal "rotisserie" mode could fall under FAA jurisdiction since that activity is undertaken to protect components from being exposed to high temperatures and, consequently, to minimize the possibility of failure during reentry.

In short, the FAA's definition of reentry and its broad claim of jurisdiction over any activity necessary to prepare for reentry leads to a situation where all on-orbit activity is candidate for FAA regulation.

Kistler's Recommendation

Kistler proposes two alternative definitions for this item.

(a) Reentry should be defined to begin when an Instantaneous Impact Point (IIP) is created. A de-orbit maneuver that is incomplete or pointed in the wrong direction, will result in a vehicle that is stranded in an orbit that will ultimately decay. This is a no different case than a satellite at the end of its useful life, or if the vehicle had not tried to deorbit at all. *Until an IIP is created, the vehicle is not reentering.*

(b) FAA licensing authority should begin with the initiation of checkout for the deorbit maneuver. If the FAA is satisfied that the checkout items are in place to identify and respond to any anomalies that may have occurred prior to the attempt to de-orbit, then what happens before the initiation of checkout should not fall under FAA licensing jurisdiction. As mentioned above, if the FAA were to include preparations for reentry under FAA licensing authority, then effectively all on-orbit activities would fall under FAA licensing authority.

2.2 *Casualty Expectation Analysis for Licensing*

Synopsis

The FAA is proposing that the assessment criterion for RLVs be $E_C \leq 30 \times 10^{-6}$ on a per mission basis.

Kistler's Comments

(a) The FAA is to be commended for not imposing an annualized assessment criterion for commercial RLV launches. An annualized assessment criterion penalizes successful commercial operators, and hinders the industry's maturation. The FAA clearly perceived this threat and acted in the industry's interests without compromising safety.

(b) Kistler believes, however, that casualty expectation is an unjustifiable assessment criterion, and that E_C analyses in general are too subjective and stifle innovation.

Casualty Expectation is an unjustifiable assessment criterion.

- RLV developers are already undertaking significant analyses to ensure the safe and routine return of their systems to their intended landing sites. These analyses are undertaken in the name of commercial viability.

- Aside from licensing, a casualty expectation analysis serves no function in an RLV, or any other program.
  - The only other industry using casualty expectation analyses is the nuclear power industry where such analyses also serve solely to procure a license.

- Commercial aircraft design and operations do not make use of casualty expectation analyses at all, yet the airlines have an enviable safety record.

Casualty Expectation is too subjective to be meaningful.

- Such items as the size and number of debris pieces, the aerodynamic characteristics of those pieces, the explosive potential of the vehicle, and the atmospheric dispersions acting on the debris, are all key values in the analysis that are largely subjective selections.

Casualty Expectation stifles innovation.

- Uncertainties in casualty expectation modeling lead to extreme conservatism in developing inputs for the analyses. This conservatism resists technological and operational innovations, some of which are likely to make RLV's safer.

Kistler's Recommendation

Kistler proposes that the FAA develop a more system-oriented approach to assessing and licensing RLV's. Such an approach would include the application of technical judgment in addition to engineering analyses that are "closer to the hardware." A new approach would be more capable of capturing the advantages of innovative operating scenarios and technology, and of accounting for the effects of reflight on the vehicle and operations crew.

Each applicant would describe the risk assessment methodology to be used for licensing purposes, as well as the assessment criterion (a), in the applicant's Licensing Plan as described in the Regulatory Framework presented above.

2.3 Separating Ascent and Reentry Risk Assessments

Synopsis

For all RLVs and most reentry vehicles, the FAA proposes to approach safety on an overall mission basis. The FAA would evaluate the safety of the ascent and descent phases of an RLV mission and would not allow it to proceed unless the combined risk of the ascent and descent phases of the mission satisfies the agency' s safety criteria.

The FAA believes that a caveat may be appropriate with respect to the appropriate public safety threshold to apply to a reentry vehicle that is designed to remain on orbit for an extended period of time and for which planned reentry is so remote from the launch event that there is no objective means or rational basis for combining reentry risk with launch or ascent risk. The FAA requests public comments on the circumstances, if any, under which it may be appropriate to separately assess the reentry risks of a reentry vehicle from those presented by the entire mission of launching a reentry vehicle into space and its subsequent reentry.

Kistler's Comments

(a) Sub-orbital RLV concepts simply push their IIP to a certain location and leave it there until the vehicle lands. In effect, the ascent bum is also the de-orbit burn. Or, assuming the definition of reentry as starting when an IIP is created, it may be stated that ascent and reentry are inseparable and the FAA is justified in using a combined risk assessment.

For an orbital concept such as Kistler's, however, the reentry cannot proceed unless the ascent was a success. Or, conversely, by the time reentry is undertaken, it is clear that ascent presented "zero" risk. Consequently, combining launch and reentry risks would simply be the development of a mathematical abstract with no bearing on public safety.

(b) From an operational standpoint, for a sub-orbital concept, launch commit really means "launch and reentry commit." There is one checkout process. Consequently, reentry systems must work without being checked out expressly for reentry, and after being subjected to the relatively severe launch environment.

For an orbital concept such as Kistler's, a separate checkout process immediately prior to reentry allows for the adjustment of the vehicle state or the implementation of mission rules in response to any degraded performance due to ascent loads.

For these reasons, Kistler believes that the FAA is justified in assessing launch and reentry risks separately for vehicles that attain orbit.

Kistler's Recommendation

Kistler proposes that

(a) Risk assessments for systems that do not attain orbit be done by combining ascent and reentry risks;
(b) Risk assessments for systems that attain orbit be done by assessing ascent and reentry risks separately;
(c) The definitional discriminator is whether the IIP exists continually from liftoff to landing (a sub-orbital mission), or whether the IIP vanishes and is recreated for reentry (an orbital mission).

2.4 Use of a Failure Probability of 1.0 for New Systems

Synopsis

To obtain a conservative risk assessment of a vehicle "lacking an adequate flight history," the FAA is proposing to require that the applicant conduct a risk analysis and assume the probability of a catastrophic failure of 1 .O.

Kistler's Comments

The FAA should define its perception of an "adequate flight history" that would enable a developer to dispense with this requirement. In doing so, the FAA should keep in mind that even the most frequently flown expendable launch systems have barely had a statistically valid number of flights from which to derive a legitimate failure probability. Requiring a specific demonstrated failure probability before attaining relief from this requirement would be detrimental to the RLV industry.

Kistler's Recommendation

"Adequate flight history" should be defined based upon experience within the system's design envelope rather than on a statistical analysis of launch history.

Specific environmental parameters (i.e., dynamic pressure, wind shear, temperature, etc.) and/or specific performance parameters (i.e., turn rates, payload weight, reentry weight, etc.) should be identified by the industry and the FAA as key indicators of system integrity. A system that demonstrates integrity in some acceptable portion of its design envelope in regard to these parameters would qualify as having an "adequate flight history."

The parameters to be addressed and the envelope values to be demonstrated will be presented in an applicant's Licensing Plan as part of the Regulatory Framework described above.

2.5 Overflight of Populated Areas

Synopsis

For a proven vehicle, the FAA proposes that a vehicle may not have substantial dwell time over densely populated areas. But for the time being the FAA proposes to determine what is 'substantial' and 'densely' on a case by case basis.

Kistler's Comments

Kistler is particularly concerned by this proposed rule. By ignoring any positive outcome of the quantitative risk analysis in the overflight of populated areas, but accepting any negative outcome as reason to deny a license, the FAA is promulgating a double standard.

Kistler's Recommendation

Kistler proposes that the FAA dispense with this rule altogether. If a system possesses an "adequate flight history" as defined above, it should be eligible to overfly densely populated areas so long as it is flown so as to remain within its demonstrated flight envelope. Demonstration of this flight envelope is precisely the purpose of a flight test program.

The characteristics of the flight test program, in particular the flight parameters and values to be demonstrated, are to be included in the applicant's Licensing Plan as described above in the presentation of the proposed Regulatory Framework.

2.6 Determination of a "Proven" System

Synopsis

The FAA "is not prepared to state in a rule of general applicability" the point at which an RLV transitions from an unproven state to a proven one. The FAA requests views on appropriate measures of validating new vehicle performance criteria for determining the point at which a vehicle may be considered 'proven.'

Kistler's Comments

Kistler believes that any new system must prove itself in two manners – its Functional Integrity and its Design Integrity.

A system's Functional Integrity consists of the ability of its components to function together for a successful flight. This Functional Integrity is demonstrated on the vehicle's first flight, and no further "proof' of Functional Integrity is necessary unless substantive changes are made in the vehicle's complement of equipment.

A system's Design Integrity is demonstrated for each operational environment in which the operator intends to fly the vehicle. A system's Design Integrity is demonstrated through a prudent exploration of its design envelope.

Kistler's Recommendation

Kistler recommends that the FAA develop, in consultation and cooperation with industry, a list of parameters that define the design envelope. Such parameters may include dynamic pressure, q-alpha, temperature constraints, etc. that typically influence vehicle design.

2.7 *Telemetry and Autonomous Operations*

Synopsis

Critical information would have to be provided to a control center or individual with command capacity and decision making responsibility. Totally autonomous initiation of reentry would not be allowed to ensure that certain clearances and system verifications are completed to assure that a reentering vehicle will not pose safety risks to the public. The FAA also proposes that an operator have the ability to activate the vehicle's flight safety system (FSS).

Kistler's Comments

(a) By explicitly requiring man-in-the-loop systems, and explicitly disallowing autonomous systems, the FAA has mandated a design solution rather than a performance standard for RLV's.

(b) By explicitly requiring man-in-the-loop systems, and explicitly disallowing autonomous systems, the FAA has blocked the development of cost effective, commercially competitive systems that may, either presently or in the future, meet or exceed FAA safety standards.

(c) The industry is in general agreement that autonomous systems represent the future of launch technology. The argument is over the timing of such development. The FAA should not promulgate regulations that explicitly cut off such development prematurely.

Kistler's Recommendations

Kistler recommends that this type of requirement be placed in an Advisory Circular expressing the FAA's preferred system configuration. By doing this, the FAA leaves the door open to innovative approaches and technological advancement rather than cementing the regulatory environment in a 1970's perception of capability.

Kistler notes that Russia has utilized autonomous flight safety systems for many years. All Progress launches, and most Soyuz launches, have flown using autonomous flight safety systems.

Kistler proposes that the FAA accommodate autonomous systems on a case-by-case basis and not explicitly cause the termination of their development. The FAA should determine performance-based standards for all types of systems and allow the market to develop the technology and hardware to meet those standards.

2.8 Assessing Continued Flightwotthiness (Reflight)

Synopsis

The FAA is not proposing rules for reflight of a particular vehicle. Rather, an applicant's demonstration that it has met the EC criteria would have to account for the effects of prior flight on vehicle performance. In other words, the system Pf would have to be adjusted to take into account the particular vehicle's flight history, and the adjustment would need to be justified to the FAA.

Kistler's Comments

Kistler is seriously concerned about the implications of this proposed rule.

For expendable launch systems, the Probability of Failure (Pf) is determined through the mathematical combination of historical data for individual system components. Even so, it is well known that when an applicant attempts to gain launch approval for an expendable launch vehicle, significant disagreement often arises between the applicant and the approval authority concerning Pf for a given system.

If Kistler understands this portion of the NPRM correctly, the FAA is now proposing that an RLV launch license applicant determine the effect of its maintenance program on the system Pf. *The FAA should be aware that there is no known or generally accepted method for determining the effect of a newly instituted maintenance program on the failure probability of a newly operational system.* Consequently, both the FAA and launch license applicants can anticipate protracted and unproductive discussions before each and every flight regarding the appropriate adjustment to the failure probability for the maintenance just completed.

The uncertainty introduced into the licensing process by this approach to determining the efficacy of an operator's maintenance program is unacceptable.

Kistler's Recommendations

The FAA, as its contribution to the development of a commercial RLV industry in the United States, must acquire the expertise and engineering judgment to properly assess an applicant's maintenance program. This assessment, of necessity, will be qualitative, but a properly trained and experienced individual will be able to recognize the strengths and identify any weaknesses in an applicant's maintenance program.

2.9 Reentry Site Definition

Synopsis

The three-sigma footprint describes the area where the vehicle will land with a 0.997 probability rate, assuming no mission failure.

Kistler's Comments

For this definition to be of any value, the contributors to the total three sigma dispersion need to be identified, or the NPRM should explicitly state that the list of contributing elements is negotiable with the FAA.

Kistler's Recommendations

Kistler recommends that the FAA explicitly state that the list of contributing elements is negotiable with the FAA, within the Regulatory Framework proposed above.

2.10 Test Program

Synopsis

The NPRM states that the FAA is not explicitly proposing requirements for a test program, but is also not willing to state when a system is considered proven. The FAA requests views on appropriate measures of validating new systems.

Kistler's Comments

Kistler believes that any new system must prove itself in two manners – its Functional Integrity and its Design Integrity.

A system's Functional Integrity consists of the ability of its components to function together for a successful flight. This Functional Integrity is demonstrated on the vehicle's first flight, and no further "proof' of Functional Integrity is necessary unless substantive changes are made in the vehicle's complement of equipment.

A system's <u>Design Integrity</u> is demonstrated for each operational environment in which the operator intends to fly the vehicle. A system's Design Integrity is demonstrated through a prudent exploration of its design envelope.

<u>Kistler's Recommendation</u>

Kistler recommends that the FAA develop, in consultation and cooperation with industry, a list of parameters that define the design envelope. Such parameters may include dynamic pressure, q-alpha, temperature constraints, etc. that typically influence vehicle design.

Based upon this list of parameters, individual applicants may define their design envelope and develop a test flight program that prudently explores that envelope. This design envelope definition and test flight program would then be incorporated into the applicant's Licensing Plan. Successful completion of the envelope exploration would qualify the vehicle as "proven."

This approach would also enable incremental "proof' of a system. Incrementally proving a system would enable an operator to institute commercial flights under various restrictions before the flight test program is complete. Under this approach, a vehicle's commercial operations would be restricted to the flight environments already demonstrated in the test program. As the test program proceeds, restrictions are lifted until the vehicle is fully operational.

2. I I Licensing of Re-entry Sites

<u>Synopsis</u>

The NPRM states that a license will be required for operation of a re-entry site.

<u>Kistler's Comments</u>

Kistler intends to develop and operate a greenfield commercial launch facility dedicated exclusively to launch, landing and recovery of its K-l aerospace vehicle. The design and operation of the Kistler launch site and facilities is integrated into the operation of the K-l vehicle, and is not a separate support function as may be the case in independently owned and operated launch vehicles and launch facilities. Requiring Kistler or a similarly situated RLV operator to secure a separate re-entry site license would arbitrarily separate integrated functions for licensing purposes, and would lead to duplicative and unnecessary licensing processes.

Kistler's Recommendation

Kistler recommends that the FAA make clear that the licensing authority to operate a re-entry site may be conferred under an appropriate operator's license where the site is dedicated to operation of the licensed vehicle.